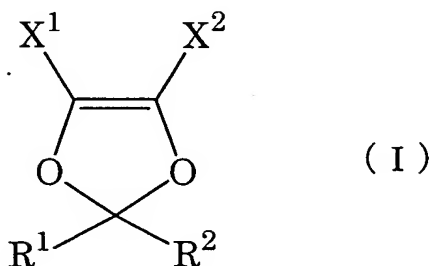CLAIMS

1.   A cyclic ether copolymer obtained from a 1,3-dioxole ring structure-containing compound represented by the general formula (I) and an ethylenically unsaturated monomer:

$$
\begin{array}{c}
X^1 \qquad X^2 \\
\diagup\diagdown \\
O \qquad O \\
R^1 \diagdown\diagup R^2
\end{array}
\qquad (I)
$$

(wherein R^1 and R^2 are the same or different and each represents F, H, Cl or a perfluoroalkyl group containing 1 to 5 carbon atoms and X^1 and X^2 are the same or different and each represents F, H, Cl or $-OR^3$, and R^3 represents a perfluoroalkyl group containing 1 to 5 carbon atoms, provided that at least one of R^1 and R^2 is F or a perfluoroalkyl group containing 1 to 5 carbon atoms),

which copolymer has a glass transition point of 100 to 135°C and an intrinsic viscosity of 0.01 to 0.4 dl/g as determined at 35°C in perfluoro-2-butyltetrahydrofuran.

2.   A laminate comprising a substrate and a thin film formed on the substrate by using the cyclic ether copolymer according to Claim 1,

wherein said thin film has a thickness not exceeding 1000 μm.
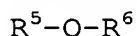
3.   A resin composition for coating

which comprises the cyclic ether copolymer according to Claim 1 and a solvent for dissolving said cyclic ether copolymer.

4. The resin composition for coating according to Claim 3,

wherein the solvent for dissolving the cyclic ether copolymer is a solvent comprising at least one member selected from the group consisting of perfluoro-2-butyltetrahydrofuran, HCFC-225, CFC-113, perfluorotrialkylamines represented by the following general formula:

$N(C_nF_{2n+1})_3$ (wherein n represents an integer of 2 to 4) and fluorine-containing ethers represented by the general formula:

R^5-O-R^6

(wherein R^5 is a straight or branched polyfluoroalkyl group containing 1 to 12 carbon atoms, which optionally contains an ether bond, and R^6 is a straight or branched alkyl group containing 1 to 12 carbon atoms).

5. An optical material which comprises the cyclic ether copolymer according to Claim 1.

6. The optical material according to Claim 5 which is a material for an optical waveguide.

7. An optical device having an optical waveguide wherein said optical waveguide has a core formed by using the optical material according to Claim 5 or 6 and/or a clad formed by using the optical material according to Claim 5 or 6.

8. The optical device according to Claim 7, wherein the core is one formed by using the optical material according to Claim 5 or 6 and, further, a rare earth metal ion.

9. A method of producing an optical device by using the cyclic ether copolymer according to Claim 1,

which comprises:

the step (1) of producing said cyclic ether copolymer,

the step (2) of preparing a resin composition for coating by using said cyclic ether copolymer and a solvent for dissolving said cyclic ether copolymer,

.the step (3) of forming a lower clad on a substrate by using said resin composition for coating,

the step (4) of forming a core on said lower clad, and

the step .(5) of forming an upper clad, by using said resin composition for coating, on said core obtained by said step (4) and formed on said lower clad.

10. The method of producing an optical device according to Claim 9,

wherein the cyclic ether copolymer is produced by using a fluorine-free organic peroxide.

11. The method of producing an optical device according to Claim 10,

wherein the fluorine-free organic peroxide is an organic peroxide comprising at least one member selected from the group consisting of oxyperesters, diacyl peroxides and peroxydicarbonates.

12. The method of producing an optical device according to Claim 9, 10 or 11,

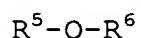wherein the core is one formed by using the cyclic ether copolymer and a rare earth metal ion.

13. The method of producing an optical device according to Claim 9, 10, 11 or 12,

wherein the solvent for dissolving the cyclic ether

copolymer is a solvent comprising at least one member
selected from the group consisting of perfluoro-2-
butyltetrahydrofuran, HCFC-225, CFC-113,
perfluorotrialkylamines represented by the following

5   general formula:

$N(C_nF_{2n+1})_3$ (wherein n represents an integer of 2 to 4) and
fluorine-containing ethers represented by the following
general formula:

R^5-O-R^6

10   (wherein R^5 is a straight or branched polyfluoroalkyl group
containing 1 to 12 carbon atoms, which optionally contains
an ether bond, and R^6 is a straight or branched alkyl group
containing 1 to 12 carbon atoms).